FORS GUIDES

Measurement of income in surveys

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Abstract:

This guide is intended for survey designers who want to collect information on income. It addresses the main decisions that have to be taken for the questionnaire design, gives an overview of the implementation of the concept in current Swiss surveys and points out particularities in Switzerland.

Keywords: questionnaire design, income concepts, measurement categories, equivalence scales, Switzerland

The FORS Guides to survey methods and data management

The FORS Guides offer support to researchers and students in social sciences, who intend to collect data, as well as to teachers at University level, who want to teach their students the basics of survey methods and data management. Written by experts from inside and outside of FORS, the FORS Guides are descriptive papers that summarise practical knowledge concerning survey methods and data management. The FORS Guides go beyond the documentation of specific surveys or data management tools and address general topics of survey methodology. They give a general overview without claiming to be exhaustive. Considering the Swiss context, the FORS Guides can be especially helpful for researchers working in Switzerland or with Swiss data.

1. INTRODUCTION

Almost all surveys in social science include questions on income. Income is an important proxy measure for socio-economic status or living standard and an important variable when modelling human decision-making processes. There are two common ways of obtaining information on income. First, asking respondents in surveys about their income. However, there are no standards and no single question(s) that fit all purposes. When designing the questions on income, research interest, response behaviour and questionnaire time need to be considered. Secondly, information on income from administrative income records can be linked to survey data. In this guide, we focus on survey questions and will briefly address income registers.

When designing questions on income one has to think about the theoretical construct of income and how the variable will be used. In this regard, the present guide addresses the following questions in section two: Should we measure household or personal income? Should we measure gross, net or disposable income? Should we measure monthly or yearly income? Should we include one summary question on income or should we collect information on different income components? Should we ask for exact income amounts or provide pre-defined income bands? Section three provides an overview on questions used in major ongoing national and international Swiss surveys. Section four discusses the adjustment of household income to household size. Section five briefly refers to additional topics on measuring income, such as treatment of data after collection and linkage to registry data. Section six lists useful literature for further reading.

2. QUESTIONNAIRE DESIGN

2.1 HOUSEHOLD OR INDIVIDUAL INCOME

The decision whether to collect information on household income or personal income (or both) should be taken according to the research interest. Assuming that financial resources are shared between household members, household income is a better measure for the living standard and probably of the social status than personal income. Yet, for specific research questions such as the influence of income on specific opinions or decisions, personal income might be more adequate than household income. From a practical perspective, the collection of personal income should yield a higher data quality and result in higher response rates than the collection of household income. Bias is likely for the variable on household income, because not every individual has sufficient knowledge on the income of the other household members and because not every individual calculates his or her income correctly.

2.2 SINGLE OR MULTIPLE QUESTIONS

An important decision to take is whether income should be measured in a simple summary measure or more in a detailed measure by separating income components (e.g., on employment income, 2nd pillar pension, unemployment benefits, alimonies etc.). To decide on one or the other way of measuring income, one should consider different points involving research interest, survey design and data quality:

Research interest

- How will the variable be used in data analysis? For classificatory purposes (e.g., social status), a single summary measure of income might be sufficient. But if income will be analysed as the main variable of interest (e.g. in the income distribution, income dynamics over time, distinction of different income components), a more detailed measure of income is required.

- Even if income is collected in a single question, a particular income source might be of particular interest for the researcher and hence, be collected by a separate question. For example, a survey that asks in detail about the economic activity, the collection of specific information on employment income is important (e.g. to estimate hourly wage).

Survey design

- Enquiring on income questions takes time. When income components are asked in detail, a significant part of the questionnaire time needs to be devoted to income questions.

- If the survey is based on individual samples or selects the respondent in a household by a random procedure, it does not make sense to ask household income components in detail. Not all individuals know the income of other household members well enough to provide valuable information. For example, an adolescent might not know all the income sources of the parents and siblings. To avoid this bias, a detailed measure of household income should only be envisaged if all adult household members within a household are interviewed (as in the Swiss Household Panel) or if a person that knows the household income can be selected within the household for the interview (as in the Survey on Health, Ageing and Retirement in Europe, SHARE).

- For research on the detailed income distribution in Switzerland, there are already several surveys with high-quality data that can be used. For household income, these include the Household Budget Survey (HBS), the Swiss Household Panel (SHP), the Survey on Income and Living Conditions (SILC) and SHARE. More details and a comparison of these surveys can be found in Suter, Gazareth, Crettaz, and Ravazzini (2016). Nevertheless, if a detailed measurement of income is necessary for a new survey, it is important to adjust the income questions to the population of the survey (e.g. youth, retired, families, unemployment). For example, scholarships or grants are mostly relevant for young respondents but hardly for the overall population. Or, disability pensions can only be received until the regular retirement age.

- If a new survey focuses on a special population, a comparison of the income of the population surveys with the general population is interesting to better situate the sample within the general population. The implementation of the same question wording as used in a survey on the general population facilitates such comparisons. For example, in a survey on single mothers, it would be interesting to analyse how average income of this subpopulation compares with income of other groups in the population.

- Detailed questions increase the resources needed to treat the data after the collection, because inconsistencies need to be checked, total income needs to be computed and imputation of missing data becomes more complex.

Data quality

- If each type of income is collected separately, total income is more precisely measured than if the measure is collected using a summary question on overall income.

- Summary questions tend to underestimate income levels. The underestimation can be reduced if respondents are reminded on the different income components (e.g. labour income, capital income, pensions, alimonies, unemployment benefits), either before or within the income question.

- Income questions tend to have relatively high non-response rates. The more questions are asked, the higher will be the share of individuals with at least one missing income component. For good data quality, missing income values should be imputed.

- With a summary question, only one type of income can be collected. With detailed questions researchers can compute the income-variable according to their needs.

Overall, there is a trade-off between precision in measuring income and questionnaire time or space in the questionnaire that needs to be devoted to income questions. In the following, we concentrate on summary questions, which will be suitable for most social-science surveys.

2.3 GROSS, NET OR DISPOSABLE INCOME

When there is only a single question on total income, only one type of income can be collected. The question at hand is, whether we should measure gross income (before social security contributions, taxes and costs for compulsory health insurance), net income or disposable income? Table 1 presents the different income concepts and lists the income components belonging to each concept of income.

Table 1. Components of gross, net or disposable income in Switzerland

Variables	Income components
Gross income	Wage and salary income + Self-employment income + Social security transfers and pensions from public sources[a] + Pensions from occupational pension funds + Private pensions + Capital income[b]
Net income	Gross income – Social security contributions
Disposable income	Net income – Taxes – Compulsory health insurance premiums – Transfers to other households (e.g. alimonies)

Notes. Some income measures add imputed rents and non-monetary income (in kind income). a = AHV/AVS (Alters- und Hinterlassenenversicherung/Assurance-vieillesse et survivants, first pillar for old age or widowhood), IV/AI (Invalidenversicherung/Assurance-invalidité, invalidity benefit), unemployment benefits, maternity leave, social assistance, child allowance; b = Income from financial and non-financial assets, royalties, regular transfers received from/paid to others, other private transfers.

Note that the term "net income" is used differently in Switzerland than in many other countries. Only social security contributions but not taxes and health insurance premiums are taken into account for the net income. The reason is that taxes and health care premiums are not deducted automatically from wages in Switzerland.

For many research questions and data analyses, disposable income would be the best measure for analysis as it reflects living standards, available resources and socio-economic status probably most accurately. However, disposable income is difficult to measure in Switzerland in contrast to other countries, because calculation errors are frequent in this income measure, as respondents need to subtract taxes, health care premiums and transfers to other households from their net income (see table 1). Hence, a single question on income is most likely biased and burdensome for respondents to answer.

In addition, the estimation of taxes is problematic for three reasons. Firstly, taxes in year t are based on income in year t-1. Therefore, the difference between net household income and disposable income does not necessarily refer to the tax burden of the current income. Secondly, respondents receive several bills and tax statements per year that make it even more complicate to find the correct tax amount. Federal taxes are billed separately from cantonal and municipal taxes and presented in separate tax statements. Taxes can be paid in various instalments and taxpayers receive credits or additional bills depending on whether too much or too little tax was paid last year. Thirdly, the tax amount might include not only income taxes but also taxes for wealth. In short, many individuals do not know their yearly tax amount and if they do, errors are likely. And even if the tax amount is known and correct, the taxes do not refer to the current income but to the income of the past. Similar problems arise for health-care premiums. More than a fourth of the Swiss population receives subsidies for health care. Depending on the canton of residence, these subsidies might be directly subtracted from the premiums or reimbursed separately. As for taxes, the subsidies received in year t are usually based on income in earlier years. For these reasons, it is not recommended to ask directly about disposable income in Switzerland. Rather, surveys should ask about gross or net income according to Swiss definition in Table 1.

An alternative approach to obtain disposable income in Switzerland is to simulate taxes and health care premiums. Due to federalism (26 different tax systems in addition to federal tax system, tax levels vary over 2000 different municipalities), this is particularly complex in Switzerland. The Tax Simulation Tool EUROMOD[1] does not cover Switzerland. The simplest way to estimate taxes in Switzerland is to rely on tables published by the Swiss Federal tax administration (SFTA 2018). These tables show the tax burden for exemplary households (single person, married couples without children, single-earner married couple with two children, double earning couples with two children, retired married couple) for different income levels and all municipalities. However, these tables give only a rough estimate, as many deductions (e.g., for child care, third pillar etc.) are not considered and many households do not match the characteristics of the exemplary households (e.g. different number of children, share of earnings of each partner in married couples, single parents).

2.4   RESPONSE CATEGORIES

There are different ways to record income. Respondents can be asked to answer the question on income in an open-ended question, by indicating the amount of income or by

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[1]Tax benefit and micro simulation for the European Union: www.euromod.ac.uk

selecting an income band from a list of response options. Income bands tend to improve the response quality but present a loss of information. With income bands, the computation of descriptive statistics or equivalised income is not straightforward, as it requires attributing an amount to each individual (see also section 3). In contrast, the collection of income amounts without bands requires data cleaning and decisions on the treatment of outliers after the data collection. There is no consensus on which approach is better.[2] Further, the survey mode has implications. Income bands are more difficult to implement in a telephone survey compared to mail, web or face-to-face, where the categories can be shown.

The information loss depends also on the number of income bands. The more income bands are proposed, the higher is the measurement precision and the more likely is item non-response and miss-classification. The provision of income deciles allows a limited number of categories and an equal distribution of income across the categories. But income deciles have the disadvantage to have unrounded unfamiliar values that take more time for classification. Moreover, the income bands need to be defined with an external data source, which implies access to this external data source and effort to compute the decile using consistent income definition. Equally spaced categories have the disadvantage, that only very few individuals will fall in some categories and many in others. In Switzerland, the European Social Survey (ESS) and the International Social Survey Program (ISSP) provide income deciles, while the Swiss Election Study (Selects) provides many income bands.

2.5   REFERENCE PERIOD

Survey designers have to decide on the reference period of income to ask for monthly or yearly income. Annual income is the international standard for income measures (Böheim and Jenkins 2006). Weekly income or fortnightly pay is uncommon in Switzerland.

When income is measured over a short period of time, income inequality and poverty rates tend to be higher and income mobility larger than for longer term income. For the UK, however, Böheim and Jenkins (2006) found that the implications for the income distribution of different reference periods are rather small. The collection of annual income has an increased risk of a recall bias and erroneous calculation.

The preferred reference period by survey respondents can be illustrated with the Swiss Household Panel that allows individuals to report either monthly or yearly income. For employment income, 77 percent named a monthly amount, 22 percent a yearly amount and 1 percent a unique amount. For self-employment income in contrast, most respondents (51 percent) named yearly amounts (43 percent indicated monthly amount, 6 percent unique amounts). For pensions and social transfers, only very few indicated a yearly amount.[3] Allowing respondents to choose the reference period, requires however a harmonization of the answer into a constructed variable and additional information on the number of months during which income has been received. When response is collected in income bands (see paragraph 2.4) both monthly and yearly amounts can be indicated.

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[2] Micklewright and Schnepf (2010) suggest that the loss of detail may not be so severe as to affect the data quality for the majority of the population. In contrast, Collins and White (1996) found that bands introduced a bias as respondents tended to select the band below which their actual income lay.

[3] Shares of respondents who indicated monthly amounts: 91% for old age pensions (AHV/AVS), 90% for invalidity pensions (IV/AI), 82% for pension funds, 85% for unemployment benefits, 94% for social assistance.

3.   EXAMPLES FOR INCOME QUESTIONS IN SWISS SURVEYS

Table 2 shows examples of how surveys either conducted by FORS or the Swiss Federal Statistical Office (SFSO) collect information on income using a single question. Some surveys include additional income questions besides the ones on income amounts listed in the Table 2: The ESS asks about the main income source,[4] the Swiss Labour Force Survey collects information on employment income, and the Swiss Household Panel asks who contributes to the household income[5] and collects detailed information on income in separate individual interviews with each household member.

Table 2. Examples for single questions to measure income in surveys conducted by FORS and the Swiss Federal Statistical Office (the exact wording of the questions can be retrieved from the documentaries of the surveys).

Survey and income measure	Question wording
European Social Survey *Disposable household income*	*Please consider the income of all household members and any income which may be received by the household as a whole.* *Using this card, please tell me which letter (income deciles) describes your household's total income, after tax and compulsory deductions, from all sources? If you don't know the exact figure, please give an estimate.*
International Social Survey Program *Net personal income*	*If you add up the income from all sources, which letter on this showcard (card shows income bands for income deciles) applies to your entire net personal income?*
Selects *Gross household income*	*Can you tell us, what the approximate monthly income of your household is? Please count all income from the people who contribute to the maintenance. Don't just count wages, but also any other additional income.* *(Interviewer instruction: If necessary, specify: gross income)*

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[4] What is the main source of income in your household? Response categories: 1.Wages and salaries 2. Income from self-employment (excluding farming) 3. Income from farming 4. Pensions 5.Unemployment/redundancy benefit 6. Any other social benefits or grants 7. Income from investment, savings, insurance or property, 8. Income from other sources

[5] Can you tell me who contributes to the household's income? Is it one person only, one person mainly, with supplementary income from other members of the household, two or several persons in an equal manner, or another situation?

Swiss Health Survey	*What is the approximate total net monthly income of your household? This means the sum of all incomes of all household members, after deduction of compulsory social security contributions and pension fund contributions, plus or less any alimony. How much is it about?*
Net household income	
Swiss Labour Force Survey	*Now we would like to know the TOTAL INCOME from your budget. We are interested in the total income of ALL household members. This includes all labour income, all capital income such as e.g. interest, shares or rental income, but also all state or private pensions or allowances such as OASI (old-age pension), unemployment benefits, disability benefits, social assistance, scholarships, maintenance contributions, etc..*
Gross household income	
Swiss Household Panel	*Can you tell me what is the total income of all the persons living in your household? (income can be indicated gross or net, per month or per year)*
Gross or net household income	

Surveys that collect more detailed information in Switzerland include the SHP, SILC, SHARE and the Household Budget Survey (HBS). For example the SHP collects information on 14 separate income components[6]. For detailed measures on income, we refer to current surveys for the implementation in Switzerland (SHP, SILC, SHARE, HBS) and to documents by the OECD (2012) and the Canberra Group (2012) for lists of income components and cross-national comparability of income measures.

4. THE ADJUSTMENT OF HOUSEHOLD INCOME TO HOUSEHOLD SIZE

To interpret the household income, the number of persons living in a household is decisive. For example, a single household who earns 100'000 a year has a higher living standard than a family with three children that lives on the same income. Therefore, it is important to consider the household size.

The standard approach to adjust for household size is to divide the income by an equivalence scale. The most frequently used scale is the modified OECD scale that assigns a value of 1 to the household head, 0.5 to each additional adult household member (older than 14 years) and 0.3 to each child (younger than 14 years). For example, the household income of a couple with two children is divided by 2.1 (1+0.5+0.3+0.3). To use the modified OECD scale, information on the household size and the age of the household members is

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[6] Employment income, self-employment income, old-age pension (AHV/AVS 1st pillar), pension from pension fund (2nd pillar), disability pension, unemployment benefits, social assistance, grants, child allowance, income from other institution, income from other households, income from other members of the same household, capital income, income from rent, other income.

required. Another frequently used adjustment procedure is the square root approach in which the square root is taken from the number of household members (for a couple with two children: $\sqrt{4} = 2$). In Switzerland, the scale applied by the Swiss Conference of Social Assistance (SKOS 2017) is an alternative. The equivalence scale amounts to 1.53 for two persons, to 1.86 for three persons, and adds 0.28 for each additional person for larger household. For the SKOS scale or the square root approach, only information on the number of persons in the household needs to be collected.

The division of the household income by an equivalence scale changes the ordering of individuals by income considerably. This can be illustrated with the data of the Swiss Household Panel. We tested whether individuals fall in the same income decile for total household income and equivalised income. Only a minority (21 percent) of individuals are in the same decile for net household income and for equivalised net household income. 26 percent are in adjacent deciles (e.g., in the 3rd decile in the first measure, in the 2nd or 4th decile in second measure). For more than half of the respondents (53 percent), the two measures are far apart (e.g., in the 3rd decile in the first measure, in the 5th decile in the second measure). The spearman correlation coefficients between net household income and equivalised net household income amounts to 0.79. This illustrates that total household income and equivalent income are two different concepts and measure different things. When income should measure the living standard, the application of equivalence scales is crucial.

The application of equivalence scales is not straightforward when income has been collected in categories rather than as an amount. To adjust income categories to household size, an amount needs to be attributed to each individual. The simplest approach is to use the midpoint of the income band (e.g., 7.500 for income category 5.000 – 10.000). However, for the highest interval (e.g., 10.000 CHF and above), this is not possible. Either the value has to be set arbitrarily or an external data source containing the detailed income distribution and the same income definition has to be used. Alternatively, an interval regression can be applied to receive predicted values for each individual (Hansen & Kneale 2012). Irrespectively of the chosen approach, errors in the ordering of individuals by income are inevitable. This bias can be illustrated again using the data of the SHP 2016 (own calculation). When the equivalence scale is applied to midpoints of income deciles rather than to measured amounts, 34 percent of all individuals are classified in the wrong decile. 29 percent fall in an adjacent decile (e.g. the 2nd or 4th decile instead of the 3rd decile), 5 percent are strongly miss-specified (e.g. the 5 percent deciles instead of the 3rd decile).

5.   ADDITIONAL TOPICS

This guide has focused on collection of income data within the questionnaire. We like to mention two different topics that we cannot discuss in more detail here.

5.1   TREATMENT OF INCOME DATA AFTER COLLECTION

Although errors in surveys can be minimized by questionnaire design and careful fieldwork, errors in the collected data are inevitable. These errors become more visible when more details on income are collected and inconsistencies appear. It needs to be decided whether and how potential errors are identified and corrected. While this effort is considerable for

detailed income data, only few tests and corrections are possible if income has been collected with a summary question or with income bands. The first step is to assess external and internal consistency and to check extreme values and non-response mechanisms. Potential corrections involve data editing, top-coding and income imputation.

5.2 LINKAGE TO ADMINISTRATIVE DATA

With the digitalization of administrative data and the introduction of a unique person identifier in Switzerland (AVS/AHV number), the linkage of survey data to administrative registries has become simple. This opens many research opportunities and may alter the way to conduct surveys. In an ideal case, questions on income can be replaced by information from administrative registries. However, data linkage raises many issues such as ethical standards, technical feasibility, comparability of survey and administrative data, data quality, data protection rules, and data access that have to be considered and cannot be discussed in this guide (for general information see Sakshaugh, 2018a, 2018b). When data linkage is planned in a new survey, it should be assured that income collected in the survey is comparable to income provided by the registry. For example, income information in registries is typically provided by calendar year, so questions in the survey should ideally refer to the same period.

6. IMPLICATIONS FOR SURVEY PRACTITIONERS

To sum up this guide, the following recommendations can be made on the basis of the discussion in the previous chapters:

Recommendation 1 – When designing income questions, think carefully about how the income variable will be used, what kind of income you want to measure, how much questionnaire time you want to devote to income questions and evaluate if respondents will be able to deliver the correct information.

Recommendation 2 – You should rather measure income with one summary question instead of multiple questions about income components, if you need information about the income only for classificatory purpose (e.g. social status). Only if the income is your main variable of interest, a more detailed measurement is required.

Recommendation 3 – Consider the advantages, disadvantages and the implications regarding survey design and data quality, when you decide whether to measure personal or household income; gross, net or disposable income on a monthly or annual basis.

Recommendation 4 – Check existing questionnaires and data on income to design your questions and eventually validate or situate your results.

Recommendation 5 – Remember to collect information on household size to be able to compute equivalised income.

7.   FURTHER READINGS AND USEFUL WEB LINKS

Hansen and Kneale (2013) discuss different implications for income measures with a special focus on the UK on poverty measures. Their article provides also a literature review on experiments and recommendations for survey questions.

Warner and Hoffmeyer-Zlotnik (2003) have analysed how well the summary measure of net household income in the ESS compares to the more detailed measure of the European Community Household Panel (ECHP).

For the development of standards and comparability of income between countries, the Canberra Group (2011) and the OECD (2012) discuss concepts and practical issues related to data quality and give recommendations for data collection.

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